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NUEXCO

Monthly Report

January 1990 **Number 257**

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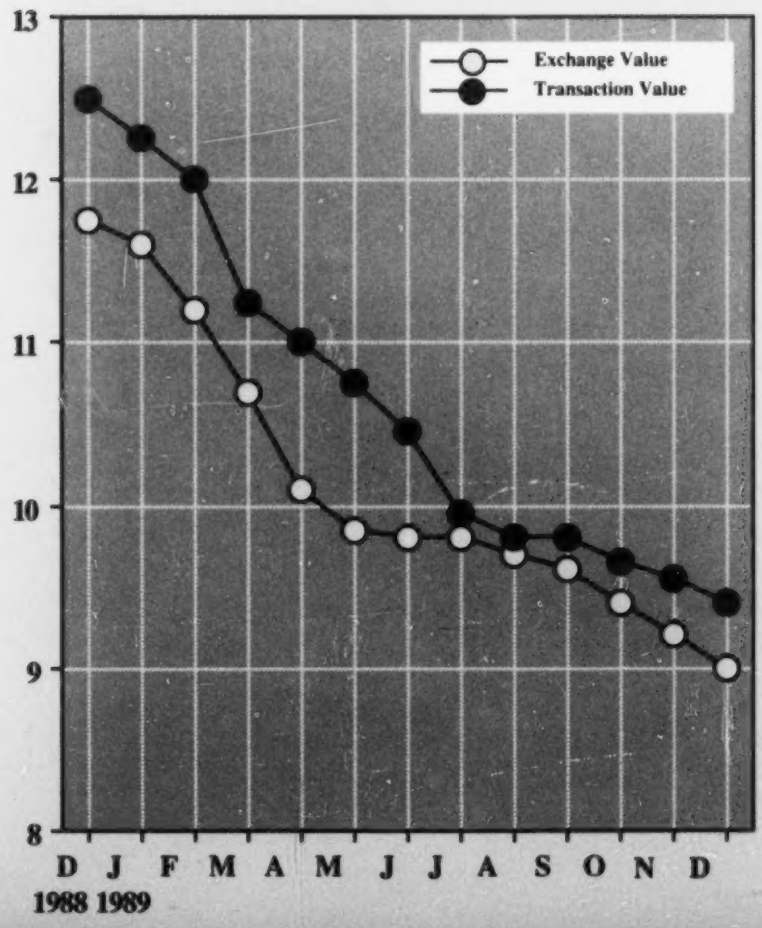

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NUEXCO Monthly Report

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Annual Review, Uranium Market Study; International Directory of Nuclear Utilities (IDNU), International Directory of Uranium Producers (IDUP)

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To Our Readers

* * *

We are pleased to announce the addition of **Ronald B. Witzel** and **Penny P. Quinn** to the NUEXCO organization.

Ron Witzel joined Pacific Gas and Electric Company in 1967, and became involved in nuclear fuel procurement activities three years later. Most recently Ron was Director of Nuclear Fuel Management, and his group was responsible for all contract negotiations, inventory management, fuel scheduling, and fuel finance and accounting activities. Ron obtained a Bachelor of Science degree in Business and Industrial Management from San Jose State University, and a Master of Business Administration from Golden Gate University.

Ron will be based in California and will work with NUEXCO International Corporation.

For the past seven years, **Penny Quinn** has been responsible for the supply of uranium concentrates and conversion services for Florida Power & Light Company's (FPL) four nuclear reactors. Between 1979 and 1983, Penny worked in FPL's nuclear fuel economics group developing long-term fuel forecasts and fuel cycle economic evaluations. Penny received a Bachelor of Business Administration degree in Finance and Accounting from Florida International University.

Penny will work with NUEXCO Information Services in Denver, Colorado.

* * *

Beginning next month, the Historical Market Data section of the Monthly Report will include a historical NUEXCO Loan Rate table. In this report, the table accompanies an article on uranium loans and the evolution of NUEXCO's Loan Rate.

MARKET VALUES SUMMARY

December 31, 1989	Market Values	Active Supply[1] (thousands)	Active Demand[1] (thousands)
EXCHANGE VALUE[1]	$9.00/lb U_3O_8	4,835**	1,750**
UF_6 VALUE[2]	$26.50/kg U as UF_6		
LOAN RATE[3]	3.5%/annum	8,235	0
CONVERSION VALUE[4]	$1.65/lb U as UF_6	1,440	225
SWU VALUE[5] 0.3 tails assay:	$54/SWU	730	400

	$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
TRANSACTION VALUE[6]	9.40	4.2	21	3

*Supply and demand tables in the *Current Market Data* section of this Report detail the numbers for each category.
**For both uranium concentrates and uranium hexafluoride.

DEFINITIONS

[1] The **Exchange Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

[2] The **UF_6 Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

[3] The **Loan Rate** is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

[4] The **Conversion Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

[5] The **SWU Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

[6] The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
a. Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;
b. At least ten transactions;
c. Transactions involving a sum total of at least 2 million pounds U_3O_8 equivalent.
The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

DERIVATIONS AND COMMENTS

•All Market Values are based on:
- Data from recently completed transactions.
- Data from pending transactions.
- Firm bids to buy or borrow, and firm offers to sell or lend.
- Prices purchasers or rates borrowers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy or borrow, and prices sellers or rates lenders have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell or lend.

• Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these Market Values.
• In the determination of prices, Nuexco does not consider transportation charges other than those customarily provided by suppliers .
• The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
• For the SWU Value, Nuexco converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the Nuexco Exchange and Conversion Values determined as of the same date.
• In calculating the Transaction Value, Nuexco does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.

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NATURAL URANIUM AND SPOT CONVERSION

(All data as of December 31, 1989)

During the final month of 1989, spot market volume for uranium sales exceeded two million pounds U_3O_8 equivalent in ten transactions. This brings the total volume of uranium sold on the spot market in 1989 to approximately 22 million pounds U_3O_8, and the total number of transactions to 100. Loans involving approximately nine million pounds U_3O_8 equivalent were made in 1989.

In other markets, 14 conversion transactions invoiving nearly 6.2 million pounds U as UF_6 were reported during the year, while eight enrichment sales involving more than one million SWU were reported.

The **Exchange Value** fell $0.20 to **$9.00** as market participants hastened to conclude deals before year-end. Approximately one million pounds of natural uranium concentrates were sold in five near-term transactions at prices ranging from 100 to 107 percent of the current Exchange Value. Most of the purchasers were US entities, consisting of three producers, one utility, and one intermediary. Sellers included two intermediaries and three producers—all from the USA. Although much of the material sold was for delivery in December 1989, more than half was specified for 1990 delivery.

* * *

The **UF6 Value** declined from $27.75 to **$26.50**, primarily as a result of the excess of UF_6 supply on the market and the widespread perception of an increasing glut. Four UF_6 sales are reported, two of which were made by highly-motivated, aggressive sellers at prices well below the current UF_6 Value.

Several US utilities are actively selling UF_6 inventories. However, a trader selling a European government's uranium stockpile continues to offer prices well below other competitive sellers. Sales are being made at current market prices, in anticipation of being covered later by purchases from the government at market-related prices that are expected to be lower. Because this transaction is designed to generate a fixed amount of revenue for the government seller, it tends to increase available supply at decreasing prices.

* * *

The **Transaction Value** dropped $0.15 to **$9.40**. The calculation includes 21 transactions involving 4.2 million pounds U_3O_8 equivalent occurring over a three-month period.

* * *

Primarily because of year-end sales and a revised estimate of material available for sale at current prices, **Active Supply** of natural uranium fell sharply from 8.3 million pounds U_3O_8 equivalent to **4.8 million** pounds. **Active Demand** decreased by about 900 thousand pounds to **1.8 million** pounds. The new **Supply/Demand Ratio** is **2.8 to 1**, compared to 3.1 to 1 on November 30. (Please note that these figures have been revised since the December 31 Notice to Subscribers to reflect additional information.)

* * *

The **Loan Rate** remained steady at **3.5 percent** per annum. Three loans are reported totalling over 500 thousand pounds U_3O_8 equivalent. One loan occurred at or

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near the Loan Rate, while two others involved other considerations which were reflected in rates above the current Loan Rate.

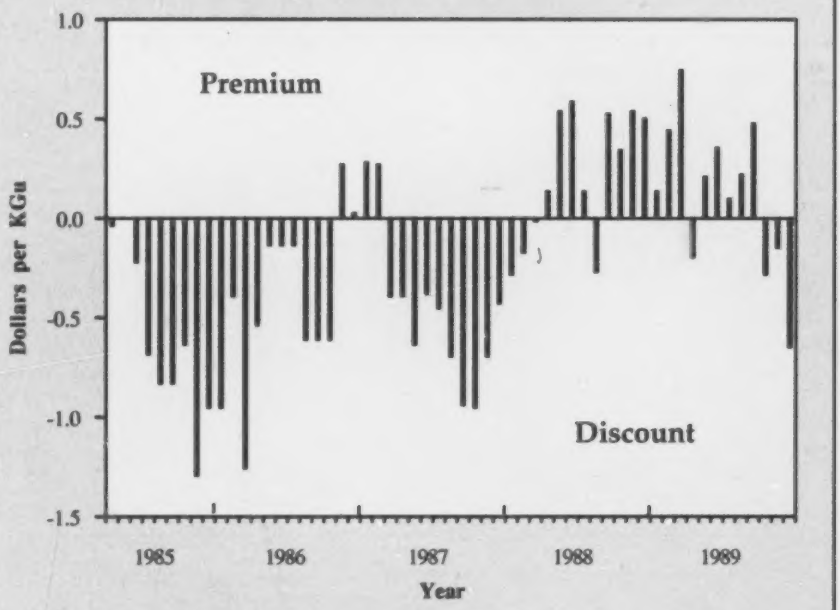
* * *

The **Conversion Value** fell from $1.75 to **$1.65** in face of increasing competition between primary suppliers and UF_6 inventory holders. No conversion sales are reported. Due to the amount of excess UF_6, and the lack of demand for conversion services, the Conversion Value remains under pressure.

This month the UF_6 Value is $0.65 less than the sum of its component values (the Exchange Value and the Conversion Value). **Figure 1** shows that variations between the UF_6 Value and the sum of its components are the rule, rather than the exception. In fact, only once (May 1985) has the UF_6 Value been exactly equal to the sum of its components.

Because it is often more convenient to purchase UF_6 than to contract separately for U_3O_8 and conversion services, UF_6 often sells for a premium. This has been the case for much of the past two years. Since October 1989, however, UF_6 has been selling at a discount relative to the component prices. This may be attributed to the large amounts of UF_6 available on the market and the lack of substantial demand for UF_6.

Figure 1
NUEXCO UF_6 VALUE LESS
SUM OF UF_6 COMPONENT VALUES[1]



[1] [(EV x 2.61284) + (CV x 2.20462)] - UF_6 Value

ENRICHMENT

The **SWU Value** declined from $57 to **$54** per SWU. One sale of a small quantity of SWU contained in enriched uranium product is reported. One US utility is evaluating SWU offers, which are reported to be at or near the current SWU Value. Another US utility is seeking offers for EUP.

SWU supply remains plentiful, and the quantity of SWU available from the previously-mentioned European government stockpile increases as SWU market prices decline. Any further weakening of the US dollar will also result in increased supply as the European government sells its inventory (priced in US dollars) to generate a fixed level of revenue (in local currency). ■

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)
Australia (dollar)	11.33	11.79	13.76	29.44	30.66	35.77
Belgium (comm. franc)	319.60	345.48	437.00	830.89	898.16	1,136
Canada (dollar)	10.41	10.73	14.02	27.07	27.89	36.44
EEC (ecu)	7.48	8.05	10.02	19.43	20.93	26.05
Finland (markka)	36.30	38.62	48.82	94.38	100.41	126.91
France (franc)	52.08	56.10	71.19	135.40	145.84	185.09
FRG (mark)	15.23	16.45	20.84	39.60	42.76	54.18
Italy (lira)	11,390	12,131	15,351	29,610	31,537	39,910
Japan (yen)	1,296	1,314	1,469	3,370	3,417	3,818
Netherlands (guilder)	17.17	18.55	23.59	44.64	48.22	61.33
South Africa (rand)	22.83	23.93	27.80	59.34	62.22	72.28
Spain (peseta)	985.11	1,060	1,331	2,561	2,755	3,461
Sweden (krona)	55.83	58.67	71.91	145.15	152.53	186.95
Switzerland (franc)	13.90	14.65	17.64	36.13	38.08	45.87
UK (pound)	5.62	5.88	6.50	14.61	15.28	16.89
US (dollar)	9.00	9.20	11.75	23.40	23.92	30.55

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)
Australia (dollar)	11.83	12.24	14.64	30.75	31.83	38.05
Belgium (comm. franc)	333.81	358.62	464.89	867.82	932.33	1,209
Canada (dollar)	10.88	11.14	14.91	28.27	28.95	38.77
EEC (ecu)	7.81	8.36	10.66	20.30	21.72	27.71
Finland (markka)	37.92	40.09	51.93	98.58	104.23	135.01
France (franc)	54.40	58.23	75.74	141.42	151.39	196.90
FRG (mark)	15.91	17.07	22.17	41.36	44.38	57.64
Italy (lira)	11,896	12,592	16,331	30,926	32,737	42,458
Japan (yen)	1,354	1,364	1,562	3,519	3,547	4,062
Netherlands (guilder)	17.93	19.25	25.10	46.62	50.06	65.24
South Africa (rand)	23.84	24.84	29.58	61.98	64.59	76.90
Spain (peseta)	1,029	1,100	1,416	2,675	2,860	3,682
Sweden (krona)	58.31	60.90	76.50	151.60	158.33	198.88
Switzerland (franc)	14.52	15.20	18.77	37.74	39.53	48.79
UK (pound)	5.87	6.10	6.91	15.26	15.86	17.97
US (dollar)	9.40	9.55	12.50	24.44	24.83	32.50

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on the last working day of the month.

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CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)	This Month (Dec 31, 1989)	Last Month (Nov 30, 1989)	12 Months Ago (Dec 31, 1988)
Australia (dollar)	2.08	2.24	2.28	4.58	4.95	5.03
Belgium (comm. franc)	58.59	65.72	72.52	129.18	144.88	159.89
Canada (dollar)	1.91	2.04	2.33	4.21	4.50	5.13
EEC (ecu)	1.37	1.53	1.66	3.02	3.38	3.67
Finland (markka)	6.66	7.35	8.10	14.67	16.20	17.86
France (franc)	9.55	10.67	11.82	21.05	23.52	26.05
FRG (mark)	2.79	3.13	3.46	6.16	6.90	7.62
Italy (lira)	2,088	2,307	2,548	4,603	5,087	5,617
Japan (yen)	237.62	250.00	243.72	523.85	551.16	537.31
Netherlands (guilder)	3.15	3.53	3.91	6.94	7.78	8.63
South Africa (rand)	4.18	4.55	4.61	9.23	10.04	10.17
Spain (peseta)	180.60	201.57	220.94	398.16	444.38	487.08
Sweden (krona)	10.24	11.16	11.93	22.57	24.60	26.31
Switzerland (franc)	2.55	2.79	2.93	5.62	6.14	6.45
UK (pound)	1.03	1.12	1.08	2.27	2.46	2.38
US (dollar)	1.65	1.75	1.95	3.64	3.86	4.30

SWU VALUE AND UF_6 VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

	SWU Value at 0.30% Tails Assay This Month (Dec 31, 1989)	SWU Value at 0.30% Tails Assay Last Month (Nov 30, 1989)	UF_6 Value per kg U as UF_6 This Month (Dec 31, 1989)	UF_6 Value per kg U asUF_6 Last Month (Nov 30, 1989)
Australia (dollar)	67.95	73.08	33.34	35.38
Belgium (comm. franc)	1,918	2,140	941.05	1,036
Canada (dollar)	62.48	66.46	30.66	32.18
EEC (ecu)	44.85	49.87	22.01	24.14
Finland (markka)	217.83	239.29	106.89	115.86
France (franc)	312.50	347.56	153.35	168.29
FRG (mark)	91.40	101.89	44.85	49.33
Italy (lira)	68,337	75,158	33,536	36,392
Japan (yen)	7,777	8,143	3,816	3,943
Netherlands (guilder)	103.01	114.92	50.55	55.64
South Africa (rand)	136.95	148.28	67.20	71.80
Spain (peseta)	5,911	6,565	2,901	3,179
Sweden (krona)	334.99	363.50	164.39	176.00
Switzerland (franc)	83.38	90.75	40.92	43.94
UK (pound)	33.73	36.41	16.55	17.63
US (dollar)	54.00	57.00	26.50	27.60

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on the last working day of the month.

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CURRENT MARKET DATA

RECENT TRANSACTIONS[1]

URANIUM SALES

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U_3O_8 equivalent)	Approximate Price Range[2] as Percent of Current Exchange or UF_6 Value	Seller	Buyer	Remarks
4701	1990	101-300	103-107	Intermediary	Producer	
4702	1989	50-100	98-102	R[3]	Utility	UF_6
4703A	1990	301–600	See Remarks	Utility	Intermediary	Contained in Low-Enriched Uranium
4704	1990	101-300	98-102	Producer	Utility	
4705	1991	101–300	R[3]	Intermediary	Utility	UF_6
4710	1990	101–300	93-97	R[3]	Intermediary	UF_6
4711	1990	301–600	R[3]	Utility	R[3]	UF_6
4712	1989	50-100	98-102	Producer	Intermediary	
4713	1990	50-100	103-107	Intermediary	Producer	
4715	1989	101-300	98-102	Producer	Producer	

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
[3] The notation R means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

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LOAN TRANSACTIONS[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U_3O_8 equivalent)	Approximate Price Range[2] as Percent of Current Loan Rate	Lender	Borrower	Remarks
4707	1989	101-300	R[3]	Intermediary	Producer	
4708	1989	101-300	R[3]	Intermediary	Producer	
4714	1989	101-300	98-102	Producer	Intermediary	

CONVERSION SERVICES SPOT MARKET SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Approximate Price Range[2] as Percent of Current C.V.	Seller	Buyer	Remarks
No transactions for conversion services are reported						

ENRICHMENT SERVICES SECONDARY MARKET SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity[4] (thousand SWUs)	Approximate Price Range[2] as Percent of Current SWU Value[5]	Seller	Buyer	Remarks
4703B	1990	50-100	See Remarks	Utility	Intermediary	Contained in Low-Enriched Uranium

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
[3] The notation R means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.
[4] If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 w/o tails assay.
[5] Prices are usually normalized to 0.30% tails assay. Refers to SWU Value that corresponds to SWUs included in transaction. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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CURRENT MARKET DATA

URANIUM SUPPLY
(December 31, 1989)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale			
ACTIVE			
89-1001	1,300	1,000 per year	1990, UF_6
89-1180	1,000	—	1990
89-1188*	60	—	1990
89-1194	100	—	1990
89-1201*	1,500	—	1990
89-1252*	375	375 per year	1990-96
89-7000A*	500	—	1990, UF_6
Total	**4,835**		
INACTIVE			
89-1029	1,200	300 per year	1990-98
89-1076	500	250 per year	1990 on
89-1128*	1,130	—	1990, U_3O_8/UF_6
89-1156*	200	—	1990
89-1209*	400	400 per year	1990-93
87-1000*	—	600 per year	1991-95
87-1005	—	250 per year	1990-95
87-1109	—	350 per year	1990-on
87-1123	—	1,000 per year	1990-on
88-1157	—	1,000 per year	1990 on, UF_6
Total	**3,430**		

* New or revised since last month.
[1] Measured from the date of this Report.
[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 88-1026, 88-1081, 89-1172, 89-1239, 89-1249.

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URANIUM DEMAND
(December 31, 1989)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
89-1183	400	—	1990
89-1218	1,000	1,000 per year	1990-93
90-1001*	350	—	1990
88-1227	—	1,600	1990-95, U_3O_8/UF_6
89-1090	—	150 per year	1991-96
89-1172	—	500 per year	1992 on
89-1176	—	600 per year	1991-96
89-1192	—	1,200	1992-97
89-1233*	—	160	1991, UF_6
89-1236*	—	250	1991-94, U_3O_8/UF_6
89-1237*	—	130 per year	1991-94, UF_6
89-1242*	—	75 per year	1992-94
89-1254*	—	270 per year	1991-2000
89-1256*	—	200 per year	1991-94
89-1260*	—	250 per year	1992-94
Total	**1,750**		
INACTIVE			
89-1067	500	—	1990
89-1163	1,000	—	1990
89-1167	350	350 per year	1990-94
89-1175*	170	170 per year	1990-91
89-1187	325	—	1990, UF_6
Total	**2,345**		

* New or revised since last month.
[1] Measured from the date of this Report.
[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 89-1189, 89-1208, 89-1230, 89-1232, 89-1238, 89-1241, 89-1250, 89-1258.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(December 31, 1989)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
87-1167	460	—	UF_6
88-1182	4,000	—	U_3O_8/UF_6
89-1077	500	—	U_3O_8
89-1186	200	—	U_3O_8
89-1196	1,300	—	UF_6
89-1206	300	—	U_3O_8
89-1225	700	—	U_3O_8
89-1248*	750	—	U_3O_8
Total	**8,235**		
INACTIVE			
None reported			
Available to Borrow:			
No inquiries to borrow are reported			

* New or revised since last month.
[1] Measured from the date of this Report.
Projects removed since last month: 89-1184.

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CONVERSION SUPPLY AND DEMAND
(December 31, 1989)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale			
ACTIVE			
89-7000C*	400	—	
89-7001A*	440	—	
89-7002*	600	—	
Total	**1,440**		
INACTIVE			
None reported			
Inquiries to Purchase			
ACTIVE			
89-1251*	225	—	
89-1245*	—	8,650	
Total	**225**		
INACTIVE			
None reported			

* New or revised since last month.
[1] Measured from the date of this Report.
Projects removed since last month: None.

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CURRENT MARKET DATA

SWU SUPPLY AND DEMAND
(December 31, 1989)

NUEXCO Project Number	Delivery Period[1] (Thousand SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale			
ACTIVE			
88-1082	25	—	1990
88-1096	190	—	1990
88-1200*	90	—	1990
89-7000B*	300	—	1990
89-7001B*	125	—	1990
Total	**730**		
INACTIVE			
87-1128	**360**	**—**	**1990**
88-1210*	**300**	**—**	**1990**
Total	**660**		
Inquiries to Purchase			
ACTIVE			
88-1236	250	—	1990-94
89-1243	150	—	1990
88-1061	—	500	1991-95
89-1203	—	135	1991-92
89-1262*	—	120	1996-99
Total	**400**		
INACTIVE			
89-1043	**50**	**—**	**1990**
89-1047	**—**	**600**	**1991-95**
Total	**50**		

* New or revised since last month.
[1] Measured from the date of this Report.
[2] For delivery within one year. This category excludes SWU deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: None.

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On December 12, 1989, the New York Times published its first pro-nuclear editorial in years. This further substantiates the growing realization by the public that the nuclear energy option must be maintained. For your interest, the editorial is reprinted below in its entirety.

Revive the Atom

Nuclear power is not inherently unworkable. It already produces 17 percent of the world's electricity, and 20 percent in the United States. Yet "nuclear," to many Americans, has become a dirty word, almost synonymous with risk, waste, cost and unseen pollution. That image is misleading. The United States cannot afford to wash its hands of an energy option that could prove both competitive and environmentally benign. The nuclear industry is worth reviving.

Technology is the easier part—a new generation of safer, cheaper nuclear power plants is already on the drawing boards. The tough part is changing public attitudes. Many have been disillusioned by the cost overruns of plants like Seabrook, and frightened by calamities like Three Mile Island and Chernobyl. No new power plant has been ordered since 1978. A fully built, $5.5 billion plant at Shoreham on Long Island, declared safe by Federal regulators, has even been prevented from operating by local fears and supine politicians.

Nuclear Power: Hardly a Pariah
How some countries produce their electricity

Country	Nuclear	Coal	Other
France	70%	9%	21%
South Korea	47	25	28
West Germany	34	49	17
Japan	28	61	11
United States	20	56	24
Soviet Union	11	37	52
India	3	72	25

Source: U.S. Council for Energy Awareness

But there are compelling reasons to rethink those attitudes. Foremost is the greenhouse effect, the threatened warming of the earth's climate by waste gases like carbon dioxide. The burning of coal, oil, gas and wood contributes to the buildup of this invisible waste. Nuclear-generated electricity does not. And unlike coal, neither does it create the acrid gases that form acid rain.

The present generation of nuclear plants has failed to thrive in the United States; no utility will build another. Yet countries like France, which lack America's energy abundance and freedom to dally, have taken the same American nuclear designs and built safe, efficient plants from which they generate substantial portions of their electricity.

These designs, however, are far from ideal. They are scaled-up versions of the plants designed to propel nuclear submarines. They need elaborate plumbing and safety devices to keep the nuclear core flooded with cooling water under all circumstances. The U.S. compounded these problems with overlarge plants, each custom-made for individual utilities. Some utilities were far less capable than others in handling these complex behemoths. Little wonder that construction time stretched from 6 years to as long as 14 years, driving costs skyward, and once in operation the plants' generating time and safety margins often proved disappointing.

But that experience cannot reasonably be taken as the last word on nuclear energy. The new plants now being designed put safety first. In the worst possible accident, they will shut themselves down with little or no intervention. The new plants would also be smaller, easier to mass-produce and simpler to regulate. The industry asserts they will be cheaper than coal-fired plants, and says some designs are so safe that off-site insurance will not be necessary. After all the false promises about nuclear energy, no one is going to take such claims on faith. But they surely deserve a fair test.

Even if the new nuclear plants can be made safe and efficient, two objections remain. One is that with conservation and new forms of solar energy, there will be no need for nuclear energy. Maybe. But the slight possibility that a nuclear option won't be needed is a poor reason for not preparing one.

A second objection is that the issue of nuclear waste is unresolved. But the technical solution—turning the waste into glass bricks that are stored in a geologically stable underground vault—is achievable; what's delaying it is political wrangling over where the waste site should be.

Safe, cost-effective nuclear power plants would be environmentally benign, and offer major insurance against climate warming. Instead of [opposing] nuclear energy under any terms, environmentalists should be pressing to create the conditions of public acceptability under which the new generation of designs can be born. Energy planners will then be able to choose among nuclear, solar and conservation. Having options almost always beats having none.

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NUEXCO

RECENT DEVELOPMENTS

WASHINGTON FOCUS

In recess since November 22, Congress will not reconvene until January 23. Its first priority upon returning to work is the FY 91 budget. Preliminary reports have indicated the Special Isotopic Separator (SIS) program the Defense Department funds at Lawrence Livermore National Laboratory may receive a reduction in funding. If Congress enacts the cut, it may affect the AVLIS research program, which is also conducted at the Lab.

Radionuclide Emissions Regulations

The EPA radionuclide emission rule was finally published in the Federal Register on December 15 (See **Table 1** below). There will be a 90-day interim period for all affected facilities to come into compliance. All mines, even those on stand-by, are subject to this requirement. Mills and other Nuclear Regulatory Commission (NRC)-regulated facilities, however, received a 60-day stay from the Environmental Protection Agency (EPA), pending a review of the implications of dual regulation (the NRC and the EPA).

A company may petition for reconsideration during the first 60-days, provided it raises a new issue or requests clarification of part of the new rule. (NUMARC has already filed a petition for reconsideration.) Since the new rule differs from the proposed rule, only those issues raised during the initial comment period or within this 60-day interim period, will be considered litigable issues before a court. Although the impact of the regulation is still uncertain, the EPA has tested data from Pathfinder Mines Corporation's underground facilities with the new Comply R compliance code, and it appears the facilities could comply with that part of the new rule. ■

Table 1
SUMMARY OF CURRENT AND FINAL RULES

Source Category	Number of Facilities	Current Rules	New Rules
DOE facilities	45	25 mrem/yr	10 mrem/yr EDE[1]
NRC licensees	6,000	25 mrem/yr	10 mrem/yr EDE
Nuclear reactors and support facilities	135	25 mrem/yr	10 mrem/yr EDE
Underground uranium mines	15	Bulkheads	10 mrem/yr EDE
Uranium tailings (disposal)	46	20 pCi/m^2-s radon	20 pCi/m^2-s radon
Uranium tailings (operations)	4	Close within 6 years and apply new technology	20 pCi/m^2-s radon
Uranium tailings (new construction)	0	Phased/continuous disposal	Phased/continuous disposal
DOE radon sources	5	No rule	20 pCi/m^2-s
Phosphogypsum stacks	40	No rule	20 pCi/m^2-s
Elemental phosphorus plants	5	21 Ci/yr Po-210	2 Ci/yr Po-210
High-level nuclear waste facilities	0	No rule	No rule
Coal-fired boilers	1,500	No rule	No rule
Surface uranium mines	2	No rule	No rule

Source: *ANS Nuclear News*, December 1989
[1]Effective dose equivalent

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Nuclear Fuel Industry Developments

December	
1	**The Western Governors Association** unanimously passed a resolution urging western representatives in the US House to support S. 83, the uranium enrichment bill.
8	Due to unresolved safety issues, **Canada's Atomic Energy Control Board** denied Ontario Hydro's **Darlington** plant an operating license for the second time.
15	**Japan's Nuclear Energy Commission of the Advisory Committee for Energy** convened to discuss **modifications to the nuclear plant construction plan** through the year 2010. This was the Committee's first meeting in three years, which arose due to difficulties in site selection
15	The $4.5 million cleanup of **Union Carbide's** uranium mill tailings site in **Green River, Utah** was completed. This was the fifth site completed under the Uranium Mill Tailings Radiation Control Act of 1978, funded 90 percent by the federal government and 10 percent by the state.
15	**Cameco** has scheduled a four-month shutdown in mid-1990 at its **Blind River** refinery and **Port Hope** conversion plant due to deteriorating market conditions.
15	**Argentina's Los Gigantes** U_3O_8 mill (150-MT/year capacity) **shut down** due to miscalculations in proven recoverable reserves. Two other uranium mills remain in operation in Argentina.
18	The **European Community (EC)** and the **Soviet Union** signed an agreement to conduct joint research and development in nuclear power, concentrating on safety. The program will be administered under the Euratom Treaty.
19	**Ontario Hydro** announced it would seek approval from a provincial environmental board to expand its nuclear capacity and build ten additional 881-MWe Candu plants to meet baseload demand through 2013.
20	**Siemens KWU, Inc.** and its affiliate **Advanced Nuclear Fuels Corporation (ANF)** announced the consolidation of Siemens' US nuclear plant activities and those of Advanced Nuclear Fuels Corporation (ANF) under a new services organization within ANF. ANF will also serve as the Siemens KWU partner in the Bechtel-KWU alliance.
28	Due to increasing electricity demand, the President of **Newfoundland** Light & Power Co. is interested in considering nuclear power as a future energy option for the Canadian island.

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BASIC CONSIDERATIONS

URANIUM LOANS

Introduction

When NUEXCO was organized in 1968, its founders conceived of a business based on uranium loans. The concept was relatively straightforward: those who found themselves with excess supplies of uranium would deposit those excesses in NUEXCO's "bank", and those who found themselves temporarily short of uranium could borrow from the bank. The borrower would pay interest based on the quantity of uranium borrowed and the duration of the loan, and the bank would collect the interest, deduct its service fee for arranging the loan, and pay the balance to those whose deposits were borrowed. In fact, the original plan was to call the firm Nuclear Bank Corporation, until it was discovered that using the word "Bank" in the name would subject the firm to various US banking regulations. Thus, *Nuclear Bank Corporation* became *Nuclear Exchange Corporation*, which was later shortened to *NUEXCO*.

Neither the nuclear fuel market nor NUEXCO's business developed quite as its founders had anticipated. From almost the very beginning, the brokerage of uranium purchases and sales became a more significant activity for NUEXCO than arranging uranium loans. Nevertheless, loan transactions have played an important role in the international nuclear fuel market, requiring the development of special knowledge and commercial techniques.

NUEXCO's Early Role

NUEXCO's role in uranium loans began in September 1968 with the publication of NUEXCO Monthly Report No. 1, and the recognition of three factors that are fundamental to any loan transaction. First was a Loan Rate, i.e., an interest rate payable to uranium lenders. In Report No. 1 that rate was described as the "Use charge payable to Depositors" and was established at four percent per annum.

Second, there was a need for a uranium value to which the interest rate could be applied in order to determine the amount of interest payable. NUEXCO Report No. 1 termed that value the Loan Value and provided that it would be calculated on a case by case basis to "recognize the peculiarities of each particular loan situation, and the need to be competitive with the Atomic Energy Commission (AEC) leasing program."

Finally, there was a need to establish a means for financial settlement of loans, because book transfers had not yet become the usual mode of delivery, and it was unlikely that the borrower would be able to repay the exact number of pounds borrowed. Thus, the first NUEXCO Report published a value, then called the Settlement Value, that was intended to be used in computing financial settlements for loan transactions when the quantity of uranium repaid was slightly more or less than the quantity borrowed. In that first Report, the Settlement Values ranged from $6.50 to $8.50 per pound U_3O_8, depending on when the loan was to be repaid.

As the market developed, the Loan Value, designed to be used (with the Loan Rate) to calculate the amount of interest payable on a loan, and the Settlement Value, designed to be used in settling uranium loans, merged and evolved into the Exchange Value, which has come to fulfill an entirely different and unexpected market role. Historical Loan Rates appear in **Table 1** on page 17.

Loan Participants

Holding most of the uranium inventory, electric utility companies have been the principal, though by no means the only, lenders. Producers, fuel fabricators, traders, and even national governments have all assumed the lender role at one time or another. Equally diverse are the reasons for lending, with the most common being the opportunity to earn a return on otherwise idle inventory. Other reasons may include one or more of the following:

- acquiring additional uranium by accepting interest in kind (uranium) in terms of pounds rather than dollars;
- enhancing or expanding existing commercial relationships;
- establishing new commercial relationships;
- assisting sister utilities, fellow producers, or others with emergency short-term needs;
- changing the form, location, or origin of particular lots of uranium, by returning material differing in one or more aspects (physical, political, or financial) from the material borrowed.

At first, NUEXCO expected utilities to become the principal uranium borrowers. And utilities did participate in some transactions as borrowers, for various reasons:

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Table 1
NUEXCO HISTORICAL LOAN RATES
Determined as of the last day of the month indicated (Percent per Annum)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

* Float with Prime Rate

- need resulting from sudden or unexpected events such as fuel failures, interruptions of supply resulting from *force majeure*, or contract litigation;
- need associated with the purchase of additional fabricated fuel, usually to achieve some end, such as security of supply;
- need associated with a recognized mismatch or window between date of need and scheduled supply;
- need to fulfill an existing conversion or enrichment obligation.

But for ten years or more, utilities have not been the principal uranium borrowers. Given current utility inventory policies and levels, even the most sudden or unexpected events are unlikely to force utilities into the loan market as borrowers; after all, it is to mitigate just such disruptions that inventories are acquired and maintained in the first place.

In fact, producers and traders have been the most frequent uranium borrowers. Producers have borrowed when unforeseen events (strikes, natural disasters, or equipment failures) threatened their ability to meet scheduled delivery commitments. While it might be possible to invoke *force majeure* in such circumstances, there may be commercial incentives (such as high delivery prices or the desire to retain the reputation for reliable delivery) that argue for going to the time and expense of arranging a loan in order

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to ensure timely delivery. Producers might also borrow for other reasons.

- A new producer might use borrowed material to effect market entry prior to onset of production.
- An active producer might use borrowed material to satisfy conscious over-commitments undertaken to exploit favorable market conditions.
- A producer might use borrowed material to fill existing contracts, thereby avoiding current expenditures for production and raising cash.
- A producer might borrow material of an origin other than its own production to preserve its own origin material for other contracts or perceived premium values.
- A producer might use borrowed material in lieu of produced material to minimize its taxable income or to otherwise manage its income tax position.

But the most common reason for borrowing is to take advantage of perceived market opportunities. Thus, seeing an opportunity to make a spot uranium sale at an attractive price while lacking immediately available supply, a producer or trader might commit to the sale, borrowing the uranium needed to make the delivery.

Loans, which are essentially contracts for future delivery, offer several advantages to the producer/borrower over conventional bank financing:

- Uranium loans are typically made at interest rates substantially below commercial bank rates.
- Compensating balances are avoided.
- Existing lines of credit will not necessarily be affected.

As in conventional financing, cash received from the sale of borrowed material is usually non-taxable upon receipt. Depending on a producer's assumptions about (a) future market conditions, (b) the value of current cash and (c) the prices at which he might be able to contract for forward supply, borrowing material to sell in the spot market might result in greater economic benefit than a conventional forward sale.

Some utility lenders have regarded producer/borrowers as particularly good credit risks, as a result of their ownership of uranium resources and control of milling capacity. Such reasoning ignores, or at least downplays, the risks inherent in factors such as regulatory or environmental concerns, grade and quantity of reserves, mining efficiency, and processing costs. Traders, with their diversification of contracts to purchase from multiple sources and a strong financial position, can present a lower overall risk profile than even a large producer/borrower.

Several other factors may also inhibit an inventory holder's willingness to lend uranium.

- Problems associated with the possibility of a uranium loan being viewed as lending credit may present a difficult situation for some government-owned utilities.
- Uranium inventories may be subject to the lien of the utility's mortgage bond indenture and, therefore, not readily available for loan without formal release by the indenture trustee.
- Some potential lenders may be concerned that a loan might cause unfavorable tax consequences if misinterpreted by tax authorities as a purchase and sale.
- Loan revenue may be used to reduce revenue which the utility would otherwise receive from fuel adjustment clauses.
- Loan revenue may be used to reduce the income which the utility would otherwise earn under allowance for funds used during construction.
- Purely commercial considerations may also have an effect. Location of the uranium (producer's mill, converter, USDOE, or storage facility), form (concentrates, natural UF_6, or enriched UF_6) and national origin may all be limiting factors.

Current Role of NUEXCO and Other Traders

NUEXCO, as previously noted, in its early years provided services to participants in the uranium marketplace through brokerage or exchange activities. In recent years, a much stronger and redirected NUEXCO, as well as other traders (including producers and utilities), have increased the volume of nuclear fuel transactions partly through the use of uranium loans. Trading and commodity lending activities are common in many commodity markets and generally increase their efficiency. Such activities provide additional capital cushions and liquidity for temporary inventory excesses, as well as additional sources of spot supply. Traders such as NUEXCO, through their active

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marketing organizations, utilize borrowed inventory to facilitate sales transactions while generally hedging any market risks with offsetting spot and long-term purchase contracts. The increased trading volume and market competition undoubtedly are factors in permitting utility/purchasers during a general oversupply period to more efficiently achieve the lowest purchase price available. Similarly, during a general undersupply period, such activities will permit producer/sellers to achieve the highest price available. Thus, uranium lending will probably not only remain an active factor in the market, but could increase significantly in the future and involve additional forms of uranium.

Loan Rates

The very concept of a loan—be it of money, a commodity, services, or something else—presumes that some type of consideration will be paid by the using party (the borrower) to the providing party (the lender). Calculating the amount of that consideration typically requires establishing an interest factor to apply to the value of the loan material. NUEXCO refers to that interest factor as the Loan Rate. In the interest of historical accuracy it should be noted that the Loan Rate was originally known as the Use Charge (from September 1968 through October 1979) and then as the Loan Use Charge Rate (from November 1979 through December 1985, when the term Loan Rate came into use).

The Loan Rate is an annual, simple interest rate which, in Nuexco Report No. 1 of September 1968, was defined as the "Use charge payable to Depositors." In the parlance of that period a "Depositor" was a lender. Since NUEXCO was to be paid a fee for its services in arranging loans, the borrower's cost was the "Use Charge" plus NUEXCO's fee.

A year later in September 1969, the Loan Rate (still then referred to as the Use Charge) was redefined in terms of what the borrower paid (rather than what the lender received), specifically as that "payable by the borrowers; depositors are paid approximately 1% less." While this definition remained essentially unchanged through October 1979, it was amplified in November 1973 with the following language as:

> "The Exchange's [NUEXCO's] judgment of the interest rate at which near-term yellowcake loans could be obtained. It is based on transaction data, the money market prime rate, and the relation between uranium near-term supply and demand. The Use Charge is paid by the borrower; the depositor receives approximately one percent less."

Other than minor, non-substantive modifications, the Loan Rate definition remained unchanged until redefined in November 1979 as:

> "NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated."

That definition was described as being based on:

> " a) Data from recently completed transactions,
> b) Data from pending transactions,
> c) Firm bids to borrow and firm offers to lend, and
> d) Rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to borrow, and rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to lend.
> e) Rates associated with old or renegotiated contracts or other than arm's-length transactions are not considered in determining the Loan Rate."

The level of the Loan Rate has varied from a high of eight percent (from late 1973 to early 1975) to a low of three percent (during the first half of 1987), and, with one exception, has always been less than (and, since 1979, substantially less than) the prime rate. That exception was a 12-month period during 1976 and 1977 when the Loan Rate was simply made equivalent to the prime rate. The historical relationship between NUEXCO's Loan Rate and the prime rate is shown in **Figure 1**.

The absolute Loan Rates established over the years reflect the interaction of three principal factors:

- the general level of interest rates,
- the current level of uranium prices, and
- the current supply/demand/inventory balance.

Reference to **Figure 1** will demonstrate that, other things being equal, any of these factors can affect the Loan Rate. Thus, during the 1970s the Loan Rate tended to move with the prime rate. However, it will also be seen that, since 1979, the dramatic developments in the latter two areas (collapsing uranium prices and enormous inventories

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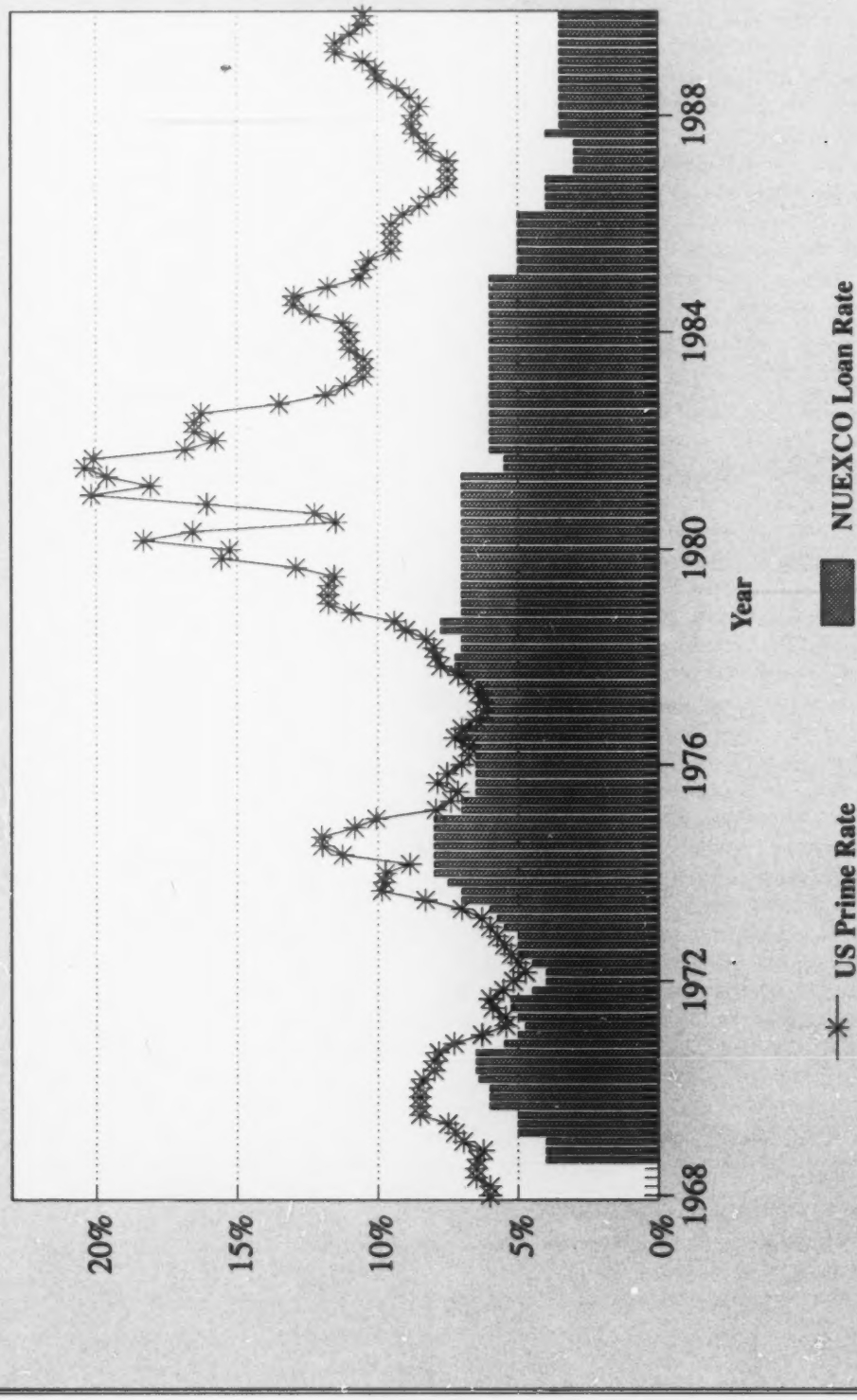
BASIC CONSIDERATIONS

Figure 1
HISTORICAL RELATIONSHIP BETWEEN THE NUEXCO LOAN RATE AND THE US PRIME RATE*



**Source*: US Federal Reserve System

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available for loan) have tended to overwhelm the influence of general interest rate movements.

Also, money markets are affected by inflation in a way that the uranium loan market is not. Interest rates in money markets are thought to be the sum of the "real interest rate", risk, and anticipated inflation. Anticipated inflation is included because in times of inflation, money returned will have a lower real value than money borrowed. But in the case of a uranium loan, the uranium returned to the lender will have the same intrinsic value as had the uranium borrowed. Thus, the variable of anticipated inflation is removed, and the uranium loan use charge rate reduces to the sum of the real interest rate and risk.

Elements of A Loan Transaction

The single most important and the fundamental concept underlying loan transactions has been and remains that the lender must perceive the potential transaction as virtually *risk-free*. That is, the lender should never find himself in a less advantageous position as a consequence of having made the loan in question. And the combination of risk-averse lenders (principally utilities) and low financial returns clearly makes it unattractive for prospective lenders to enter any transaction with the potential to prove troublesome or embarrassing at some later date. The financial incentives are simply too small, and, even were they greater, such risk taking would still be outside the normal business charter of utility companies.

While each loan may have its own unique characteristics, all loan transactions have certain basic elements.

- **Loan Material**—the quantity, form, and origin of the material borrowed.
- **Delivery Location**—the location at which the borrower elects to take delivery of the loan material.
- **Delivery Date**—the date on which the borrower elects to take delivery of the loan material.
- **Replacement Material**—material equivalent in quantity, form, and origin to the loan material.
- **Replacement Location**—the location at which the lender requires delivery of the replacement material.
- **Replacement Date**—the date on which the lender requires delivery of the replacement material.
- **Loan Rate**—the annual interest rate utilized to calculate the loan fee.
- **Loan Value**—the monetary value assigned to the loan material.
- **Loan Fee**—the result of applying the loan rate to the loan value.
- **Security**—provisions relating to the assurance of timely delivery of the replacement material or lender's recourse in the event that borrower fails to perform.

The first three elements tend to be driven by the borrower's needs, for presumably the borrower will only undertake the transaction if he can obtain what he wants, when and where he wants it. The second three elements are generally determined by the lender, usually based on where and when the replacement material is needed for the next step in processing.

Almost without exception, the loan transactions being concluded today are structured as direct, two-party deals between a lender and borrower. This is the case even if a broker or other intermediary has assisted in arranging the transaction. In the early 1970s, however, many loans, particularly those involving NUEXCO, were structured as tri-partite deals, with the contract being signed by the lender, the borrower, and the intermediary. The loan material went from the lender to the borrower through the intermediary. Most importantly for the intermediary, the loan fees were paid by the borrower to the intermediary, who, after deducting his fee, paid the balance to the lender. The replacement material followed the same route. But regardless of structure, the loan rate and the security provisions have always represented the commercial heart of the loan transaction.

A Model Loan Transaction

Given these elements, it is helpful to think in terms of a model or archetypical transaction as a reference for actual transactions. It is important to note that this is only a model, and that the prevailing terms for actual loans vary from time to time as market conditions change. Such a model would have the following features:

- The **loan material** could involve any quantity, form, or origin, but unusual combinations of these attributes would require rate adjustments.

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- The **delivery location** would be a North American or European conversion, enrichment, or fuel fabrication facility.
- The **delivery date** would typically be within three months of closing date.
- The **replacement material** would be identified in quantity, form, and national origin to the loan material. For example, if 100,000 pounds of Canadian-origin yellowcake were borrowed, 100,000 pounds of Canadian-origin yellowcake would be returned.
- The **replacement location** would be the same as the location of the loan material before delivery to the borrower.
- The **replacement date** defines the duration of the loan and would be in the range of 6 to 24 months.
- The **loan rate** would equal or approximate the then-current NUEXCO Loan Rate.
- The **loan value** would be equal to the relevant NUEXCO Market Value current at the time of the transaction.
- The **loan fee** would be payable in cash, quarterly or annually.
- The **security** provided to assure a borrower's performance could be any form that would satisfy the lender that the transaction would be virtually risk-free.

Commercial Variations

Variation from the model is the rule rather than the exception. As might be expected, variance in one area affects others, particularly with respect to the loan rate.

Duration

While most loans have a duration of 6 to 24 months, the borrower or lender occasionally wants a shorter or longer term. Shorter-term loans normally result in higher effective loan rates, for lenders typically require some minimum compensation for undertaking the transaction. For example, with a loan value of $10.00 per pound U_3O_8 and an annual loan rate of 3.5%, a loan of 200,000 pounds U_3O_8 would return the lender less than $6,000 per month, a scant return if the loan term were only a few months. If the lender required a minimum return of about $50,000, and if the loan were repaid in six months time, the effective loan rate would have been about 5%.

Lenders will typically also insist on a minimum return when, as is often the case, the borrower has the choice of when to repay, subject only to some "not later than" date. Shorter-term loans are also apt to involve simpler security provisions, for there is less likelihood of significant changes in the value of the loan material.

Conversely, longer loan periods may, in some cases, result in lower loan rates which recognize the extended period during which the lender will receive an assured cash flow. Higher loan rates may also be appropriate in some cases for longer loan periods to compensate for a longer risk period. The security provisions for longer-term loans become more complex, because a longer loan term increases the chance that the value of the loan material may increase or decrease, perhaps substantially, requiring commensurate adjustments in the value of the borrower's security.

Replacement Material

Historically, replacement material has been identical, in terms of quantity, form, location, and origin, to the loan material. Over the past several years, it has become increasingly commonplace for the replacement material to differ from the loan material in one or more important aspects. Thus, a borrower may borrow yellowcake of one origin, and, at either the lender's or borrower's request, return yellowcake of another origin or form or at another location. For example, U_3O_8 has been borrowed and UF_6 returned, making it difficult to separate and value the loan rate and the conversion component. The two participants in such a transaction can themselves value the components differently, each achieving their own objectives. In an enriched product loan, the situation becomes more complex, for it is necessary to deal with the origin of both the SWU and the feed. In such cases, the role of traders becomes particularly useful by virtue of their ability to deal with multiple parties and complexity in general.

Replacement material that differs from loan material is the principal reason for loan rates that diverge from the NUEXCO Loan Rate, but all transactions are considered by NUEXCO in reaching its judgment as to the NUEXCO Loan Rate.

A final consideration relating to replacement material involves not replacing it at all. The right to close out loans, via a borrower's "call" or a lender's "put," while not common is not unknown. Loan fees paid prior to such a transaction may be applied, in whole or part, to the price of the material. Such variations also make it difficult to evaluate the real loan rate in the transaction.

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Loan Rates

As previously noted, the loan fee is the result of applying the loan rate to the loan value. But, as also noted, loan fees may, under certain circumstances, be established as lump sums, or, in other cases, as an amount per quantity unit per time period. Thus, a loan fee of $0.001 per pound U_3O_8 per day, based on a U_3O_8 value of $10.00 per pound, equates to an annual loan rate of about 3.65 percent.

Loans are also sometimes repaid in kind (additional replacement material) or services. If in kind, the loan fee would usually be expressed in units of replacement material per time period, such as 1,000 pounds U_3O_8 equivalent per month.

Over the longer term, the level of loan rates has reflected the interaction among general interest rates, uranium prices, and the perceived supply/demand balance within the uranium market. But the loan market is both smaller (fewer participants) and less active (fewer transactions) than the conventional buying/selling arena, and, consequently, is less efficient, responding more slowly and with less precision to changing market conditions.

In a given transaction, the particular situations of individual lenders and borrowers can, at times, override market conditions. Thus, a producer with an immediate need to borrow a certain origin U_3O_8 at a specific converter, may find there is but a single potential lender of the needed material. If that lender, knowing he is a sole source, were to demand a loan rate that is twice the NUEXCO Loan Rate, the producer has a simple choice—pay the higher rate or forget the prospective deal.

Security

In the early 1970s when uranium prices were both relatively low and stable, loan transactions were something of a novelty and most were based on the full faith and credit of the borrower. The standard remedy was a so-called "hell-or-high-water" clause which provided that the lender could, if the replacement material was not delivered as scheduled, procure additional replacement material, the cost of which would be fully borne by the borrower. Such a remedy was suggested by similar provisions of the Uniform Commercial Code.

By the mid-1970s, however, lenders had become increasingly cautious in the face of sharply rising uranium prices and growing concerns about the availability of adequate long-term supplies. In the loan market, these concerns translated into security provisions more stringent than full faith and credit of the borrower. Other provisions relating to the assurance of timely loan repayment or lender's recourse if the borrower failed to perform have included:

- letters of credit (L/C);
- performance bonds;
- security deposits;
- grant-of-production payments;
- liens on and assignments of interest in uranium, uranium properties or reserves, or borrowers' uranium purchase contracts;
- other security.

For a number of years, both lenders and borrowers of uranium did their very best to avoid involvement with commercial bankers and L/Cs. However, the irrevocable standby L/C has become the preferred form of security, and as lenders have become more insistent, it has also become the most common. Furthermore, it is not unusual for the lender to require that the value of an L/C securing a uranium loan be periodically adjusted, to ensure that its value remains equivalent to the market value of the loan material. Nevertheless, full faith and credit of the borrower or other equivalent security are often adequate as security, depending on the particulars of the deal.

Conclusion

Loan transactions, originally visualized as being relatively straightforward deals (borrow now, pay interest, return later), have evolved into increasingly sophisticated and complex arrangements which borrowers and lenders are using to achieve entirely different ends than replacement near-term supply. For their part, lenders are benefiting from the ability to obtain enhanced financial returns, and changes of origin, location, or form. Such transactions are also having a substantial market impact by helping to mobilize substantial, heretofore frozen, inventories, thereby increasing market supply and hastening the redistribution of these inventories. Loan transactions may not only increase in the future in size and number, but may include forms not common in today's market. Production planning by the producing segment of the industry must take into account the impact of the increased market supply from inventories of commodities and services, or the time of the ultimate swing in the supply/demand cycle will simply be deferred. ■

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1989 Nuclear Fuel Industry Developments

(Listed chronologically by region)

Africa

MARCH

1 The UN Security Council approved Resolution 435 establishing a plan for **Namibia**'s independence, agreed to by Cuba, South Africa, and Angola in December 1988. The Security Council's approval was the final formality required.

APRIL

1 UN Resolution 435 went into effect, launching **Namibia**'s transition to independence.

SEPTEMBER

6 F.W. de Klerk's National Party won a majority, albeit reduced, in **South Africa**'s Parliamentary elections. Voting results clearly indicated the electorate had shifted to the left, thus improving the climate for political reform.

25 At its 1989 conference in Vienna, the IAEA resolved to consider and make a decision in 1990 on the suspension of **South Africa** from IAEA membership.

NOVEMBER

7-11 **Namibia** held its first free national elections, which determined how many seats each political group would hold in the constituent assembly charged with drafting a constitution. The South-West Africa People's Organization (SWAPO) won 57 percent of the vote, but failed to win the two-thirds majority required to write its own constitution.

Australia

JANUARY

3 British Petroleum Co. (BP) and Rio Tinto Zinc (RTZ) reached agreement for RTZ to acquire all of BP's mineral interests, including its 49-percent share in the **Olympic Dam** project.

MAY

Late May BP and RTZ announced their agreement valuing BP's share of **Olympic Dam** at A$800 million (approximately US$600 million). Western Mining's first right of refusal to preempt RTZ expires at the end of September.

AUGUST

4 Western Mining filed a suit against **BP** seeking to invalidate BP's notice of intent to sell its 49 percent interest in the **Olympic Dam** project to RTZ.

SEPTEMBER

4 Primary Industries and Energy Minister John Kerin announced he had approved **ERA**'s renegotiation of two uranium contracts with new floor prices of US$26 per pound U_3O_8, indicating a significant shift in Australia's ten-year old floor price policy.

11 BP withdrew its notice of intent to sell its 49-percent share in **Olympic Dam** to RTZ.

26 Pioneer International announced it would sell all its mineral interests, including **Queensland Mines Ltd.**—the founder and developer of the Nabarlek deposit.

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Europe—Eastern

MARCH

Mid-month As part of an overall government restructuring, **Yugoslavia**'s new federal premier abolished the Commission of the Federal Executive Council for Atomic Energy (FEC), and announced a new regulatory organization would be established comprising technical experts and FEC members.

APRIL

20 The **USSR** Council of Ministers voted formally to cancel all RBMK (Chernobyl-type) reactors both planned and under construction. They also adopted plans to rebuild 14 reactors constructed in the 1970s to add safety equipment and improve technical specifications.

27 **Czechoslovakia** announced three new nuclear plant sites for development of the country's third generation of nuclear power.

MAY

15 The inaugural meeting of the World Association of Nuclear Operators (WANO) was held in **Moscow**. The new organization was formed to seek ways to prevent future nuclear accidents through the exchange of information.

12 **Hungary** announced plans to phase out by 1992 its operating uranium mines in the Mecsek mountains due to difficult geological conditions and rising operating losses.

JUNE

20 The **Yugoslavian** Parliament banned construction of additional nuclear plants or waste processing facilities.

JULY

4 The **USSR** has reorganized its nuclear ministry. The new Ministry for Nuclear Power, Engineering and Industry will be headed by Vitaly Federovich Konovalov.

SEPTEMBER

26 **Hungary** became the first Comecon country to adopt the new IAEA protocol on civil liability for nuclear accidents.

NOVEMBER

20 Canada and the **USSR** agreed to cooperate in nuclear technology development, and uranium exploration and development.

Europe—Western

JANUARY

12 The **French** government approved the restart of the 1,200-MWe Super-Phenix 1, which had been down since May 1987.

18 Siemens-Kraftwerk Union acquired two **West German** fuel fabricators—Reaktor-Brennelement-Union mbH (RBU) and Alkem GmbH—which together will be known as Siemens Brennelementewerk Hanau (SBH). The Minister of Environment approved an operating permit for the new division on January 18.

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Europe—Western
(Continued)

FEBRUARY

16 The **United Kingdom, France, West Germany, Belgium, and Italy** signed a formal cooperative agreement for the development of commercial fast breeder reactors.

MARCH

8 **Switzerland**'s lower house of Parliament approved a federal plan calling for the abandonment of the Kaiseraugst nuclear plant.

10 In response to the discovery that heavy water had been illegally rerouted to India, **Norway** passed a law banning all exports of heavy water except for small quantities to be used for research purposes.

APRIL

13 **Framatome** and **Kraftwerk Union** (KWU), a division of Siemens, signed a formal accord to jointly develop and market PWRs through a 50-50 joint venture called Nuclear Power International (NPI).

27 The **Swiss** government rejected two referenda calling for moratoriums on nuclear power.

MAY

8 **Asea Brown Boveri AG (ABB)** and **Siemens AG** announced they would jointly develop high temperature reactors under the name HTR-Gmbh Gesellschaft für Hochtemperaturreaktoren.

12 Neckarwestheim-2, the last LWR in **West Germany**'s convoy program, entered commercial operation.

13 **CEGB**'s 610-MWe Torness Point 2 AGR began commercial operation.

31 DWK, the **West German** utility consortium, announced it was cancelling the controversial Wackersdorf reprocessing plant under construction in Bavaria, and would seek spent fuel disposal arrangements at La Hague in France, or with BNFL in the UK.

JUNE

2 **Asea Brown Boveri** and **Westinghouse** announced plans to jointly market nuclear services in Europe.

15 Environmentalist groups almost doubled their seating through the **European Parliament** elections. Out of the Parliament's 518 seats, the Greens gained 19 seats for a total of 39, while the Socialists, the largest group in Parliament, gained 15 seats, bringing its total to 181. Although voter turnout was low (56%), the election results gave some indication of the political climate in Europe.

Late June The **West German** government began soliciting bids for DM1.5 billion of its Offset stockpile.

JULY

7 Electricité de France asked the **French** government for permission to delay initial construction of its planned Civaux nuclear reactor until late 1991.

AUGUST

15 The **North Rhine-Westphalia** state government announced its decision to close the THTR-300 high-temperature gas reactor owned by Hochtemperatur-Kernkraftwerk GmbH (HKG).

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Europe—Western
(Continued)

SEPTEMBER

8 **Urangesellschaft mgH (UG)** announced that the uranium trading activities of **STEAG Kernenergie GmbH**, a wholly-owned subsidiary of STEAG AG, would be transferred to UG.

14 **Framatome S.A.** announced the $50 million acquisition of half of **Babcock & Wilcox**'s nuclear services business. Through the new joint enterprise—B&W Nuclear Service Co.—Framatome will have direct access to the US market. The merger was also aimed at expanding B&W's scope of operations and competitiveness in the USA.

OCTOBER

18 Following a year-long study on the nation's nuclear industry, the **French** government reaffirmed its commitment to nuclear power, while announcing plans to reorganize some of its policies and operations.

19 A fire shut down **Spain**'s Vandellos-1 plant. Although no radioactivity was released, the nuclear plant accident was the most serious to date in Spain, and has aroused much public concern.

NOVEMBER

9 The **United Kingdom's** Energy Secretary John Wakeman announced the exclusion of nuclear energy from the UK's electricity privatization program because of concerns about nuclear's high costs. The UK also cancelled three PWRS similar to Sizewell-B.

13 **Asea Brown Boveri Ltd. (ABB)** reported it would purchase **Combustion Engineering (CE)** for US$40 per share, or approximately $1.6 billion, and concentrate on expansion in the US nuclear market.

28 **British Nuclear Fuels Ltd. (BNFL)** announced it would establish a US subsidiary to vie for clean-up work at DOE's nuclear sites and to offer assistance in nuclear plant decommissioning.

DECEMBER

18 The **European Community** and the USSR signed an agreement to conduct joint research and development in nuclear power, concentrating on safety.

20 **Siemens KWU** and its affiliate **Advanced Nuclear Fuels Corporation (ANF)** announced the consolidation of both companies' nuclear plant activities under a new services organization within ANF.

Far East

FEBRUARY

10 **Japan**'s Shimane 2, a 780-MWe BWR, began commercial operation.

MAY

18 **Japan**'s Power Reactor & Nuclear Fuel Development Corp. commissioned the second unit of its prototype enrichment plant at Ningyo Toge. Like the first unit, DOP-2 has a capacity of 100,000 SWU-per-year.

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1989 DEVELOPMENTS

Far East
(Continued)

JUNE

22 Tomari 1, a 550-MWe PWR and **Japan**'s 37th nuclear reactor, entered commercial operation.

JULY

23 The pronuclear Liberal Democratic Party lost its majority in **Japan**'s Upper House elections. The Japan Socialist Party, which has an antinuclear platform, more than doubled its seating. This development may make further advancements of Japan's nuclear power program more difficult.

SEPTEMBER

27 Operations resumed at **Power Reactor & Nuclear Fuel Development Corp.**'s Tokai reprocessing plant, which had been closed since June 1988 for modifications.

OCTOBER

13 Korea Electric Power Company (KEPCO) announced plans to build three new nuclear power plants—one of a Canadian Candu design (construction to start in 1991), and two PWR's to begin construction in 1992.

NOVEMBER

3 **China** announced plans to construct several nuclear power plants between 1991 and 2000 to meet its rapidly rising electricity demand.

18 The **Japanese** government released a white paper promoting increased world reliance on nuclear power rather than fossil fuels because of environmental considerations.

DECEMBER

15 **Japan**'s Nuclear Energy Commission met to discuss modifications to the nuclear plant construction plan through 2010.

North America

JANUARY

1 The **US/Canada** Free Trade Agreement went into effect.

11 The **US Supreme Court** upheld a Pennsylvania law barring utilities from recovering costs associated with abandoned nuclear power plants.

12 President Bush appointed Admiral James Watkins, a former commander in the Navy's nuclear submarine program, **US Secretary of Energy**.

23 The **US Supreme Court** upheld a state law barring utilities from raising rates to recover costs associated with abandoned nuclear plants.

25 US Sen. Wendall B. Ford (D-Ken) introduced **S. 83** to the Senate establishing the amount of prior unrecovered government cost for enrichment services at $364 million, and limiting the payback period to 20 years.

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North America
(Continued)

JAN. (cont.)

27 The **US Producers** ended their four-year lawsuit against the US DOE by filing a Motion to Dismiss Without Prejudice in the USA District Court.

FEBRUARY

16 **DOE** announced a FY 1990 SWU price of $122/SWU for its USEC holders.

22 Rep. Marilyn Lloyd (D-TN) introduced **HR 1100** barring US utilities from purchasing Soviet enrichment.

28 New York Governor Cuomo signed a new agreement with Long Island Lighting Co. to shut down the **Shoreham** nuclear plant. The agreement exempted legislator approval and left rate hike determinations to the Public Utility Commission.

MARCH

7 The **Environmental Protection Agency (EPA)** published its proposed rules for stricter radionuclide emission controls, which would dramatically elevate costs of uranium operations.

16 Baltimore Gas & Electric's **Calvert Cliffs Unit 2** became the first PWR in the world to complete a planned 24-month operating cycle. The unit's capacity factor during this period was approximately 98.5 percent.

17 Senator Pete Domenici (D-NM) introduced **uranium revitalization legislation** as an amendment to Senate Bill 83 introduced in January, which sets DOE's unrecovered enrichment costs at $364 million.

28 **Cameco** announced an extensive reorganization plan in view of declining uranium prices and excess inventories worldwide. The plan included work reduction at the Blind River uranium refining plant and at the Port Hope conversion facility. In addition, Cameco announced the closure of its Rabbit Lake mine for a six-month period.

Late March **Malapai Resources Company** began production at its Christensen Ranch ISL project in Wyoming.

APRIL

1 Nineteen utilities announced full or partial cancellation of their DOE **USEC contracts**.

5 The Nuclear Regulatory Commission adopted **new nuclear plant licensing procedures** which call for early site approval, standardization of reactor designs, and issuance of a combined construction permit and conditional operating license.

13 **Mexico's** first nuclear power plant, Laguna Verde-1, a 654-MWe BWR, was connected to the grid.

20 The Nuclear Regulatory Commission unanimously approved a full-power operating license for the **Shoreham** nuclear plant, although LILCO, the plant's operator, agreed not to operate the plant above 5 percent power until LILCO's shareholders voted on the agreement (all were in favor of the sale).

MAY

26 The Nuclear Regulatory Commission issued Public Service Company of New Hampshire a low-power operating license for **Seabrook**, after intervenors failed to obtain a stay of the license.

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1989 DEVELOPMENTS

North America
(Continued)

JUNE

6 California voters passed the first anti-nuclear ballot initiative in the USA, opposing further operation of Sacramento Municipal Utility District's **Rancho Seco** plant.

9 Urenco announced its joint venture—**Louisiana Energy Services**—with Duke Power Co., Graystone Corp. (a subsidiary of Northern States Power Co.), Louisiana Power & Light Co., and Fluor Daniel, Inc. to construct a 1.5 million SWU-per-year plant in Louisiana. Estimated to cost $750 million, the plant is targeted for operation in 1996 and would be the first privately-owned enrichment facility in the USA.

13 **Seabrook** began low-power testing.

14 Commissioner Kenneth Carr was appointed **Chairman of the Nuclear Regulatory Commission**, replacing Lando Zech.

JULY

13 The **American Society of Mechanical Engineers** released a position paper on energy and the environment, recommending the US develop and promote domestic reprocessing.

18 Central Electricity Generating Board Exploration (CEGBE) purchased from Everest Minerals Corp. the controlling interest in the **Highland Uranium Project Joint Venture**, which owns a 75-percent interest in the Highland uranium mine in Wyoming.

20 The US Senate passed S.83, the **Uranium Enrichment Act of 1989,** covering reorganization of DOE's enrichment enterprise, uranium revitalization, and establishing a mill tailings fund, by 73 to 26.

AUGUST

10 Chevron announced it would shut down its **Mt. Taylor mine** in October unless a partner or purchaser could be found. Mt. Taylor production totalled over 1.7 million pounds U_3O_8 in 1988, or about 11 percent of total US production.

29 Due to the high cost of making necessary repairs, Public Service of Colorado announced it would shut down its **Fort St. Vrain** nuclear plant immediately, rather than in June 1990 as scheduled. Fort St. Vrain, the only operating gas-cooled reactor in the USA, became the first nuclear plant to have been shut down by a utility voluntarily.

SEPTEMBER

5 The US DOE announced it would provide $50 million each to **Westinghouse Electric Co.** and **General Electric** to develop passively safe reactors.

14 DOE informed its USEC customers that it would lower its estimated **FY 1990 SWU ceiling price** by $2 to $118, due to savings in power costs.

26 Largely as a result of Chevron's decision to close its Mt. Taylor mine, **Homestake Mining** announced it would shut down its Grants, New Mexico mine and mill on December 1.

OCTOBER

13 **Freeport Uranium Recovery Co.** reported it would place its Sunshine Bridge mine on standby until the uranium market improves. Sunshine Bridge, located in Louisiana, has produced about 400 thousand pounds annually from by-product operations.

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North America
(Continued)

OCT. (cont.)

23 The **US Department of Commerce** reported that sufficient uranium supplies exist to meet domestic requirements during a national emergency. Section 232 of the Atomic Energy Act requires this study when imports exceed 37.5 percent of actual US uranium requirements for two consecutive years.

24 An **NRC** spokesman said the agency planned to extend the operating lives of nuclear plants to 50 or 60 years. Although the Atomic Energy Act only allows 40-year licenses, there are no restrictions on extensions.

27 **Uranium Resources, Inc**. issued a press release confirming it would be purchased by Rio Algom Corp. (The sale later fell through.)

NOVEMBER

13 The Atomic Safety & Licensing Board found **Seabrook**'s emergency plan "adequate and implementable and recommended that the NRC issue a full-power operating license.

20 **Umetco Minerals** announced a cutback in its uranium and vanadium activities in Western Colorado as well as its Eastern Utah milling operations. Umetco produced about 650 thousand pounds U_3O_8 in 1988.

20 **Canada** and the Soviet Union agreed to cooperate in nuclear technology development, uranium exploration and development.

28 **DOE** announced a seven-year delay in the operation of a permanent nuclear fuel waste repository. The repository will not begin operation before 2010.

DECEMBER

15 The $4.5 million cleanup of **Union Carbide**'s uranium mill tailings site in Green River, Utah was completed. This was the fifth site completed under the Uranium Mill Tailings Radiation Act of 1978.

15 **Cameco** has scheduled a four-month shutdown in mid-1990 at it Blind River refinery and Port Hope conversion plant due to deteriorating market conditions.

19 **Ontario Hydro** announced it would seek approval from a provincial environmental board to expand its nuclear capacity and build ten additional 881-MWe Candu plants to meet baseload demand through 2013.

South America

MAY

14 Carlos Saul Menem, a staunch advocate for an independent nuclear fuel cycle for **Argentina**, was elected President of Argentina.

AUGUST

24 President Menem concluded a three-day visit to **Brazil** by signing several cooperative agreements including an extension to a joint nuclear development pact. This visit indicates a continued effort to improve relations between the two countries.

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1989 DEVELOPMENTS

South America
(Continued)

OCTOBER

17 A **Brazilian** court ordered Angra-1 to remain shut down temporarily after refueling, following a class action suit led by Green party members.

DECEMBER

17 Fernando Collor de Mello was elected **President of Brazil.** Because the center-right politician supports private business development, this could benefit industrial efforts in the nuclear field.

25 **Argentina's** Atomic Energy Commission shut down the troubled Los Gigantes concentrating plant due to poor operations and major overestimates of yellowcake reserves in the deposit.

* * *

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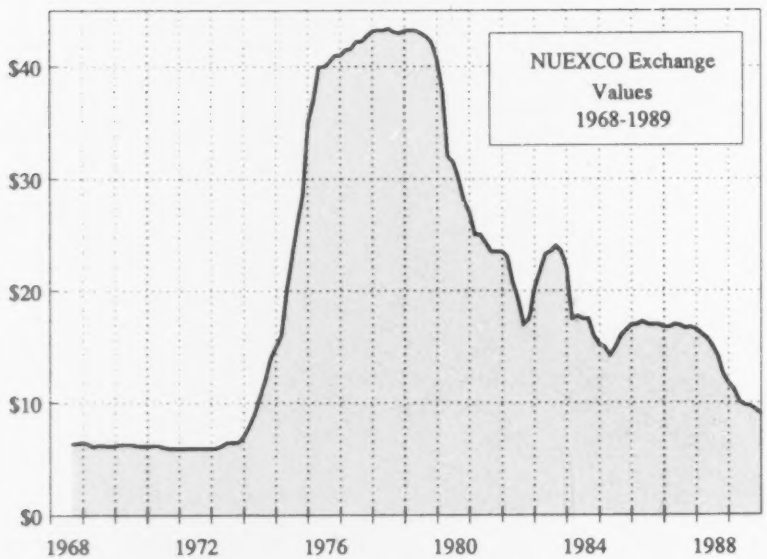
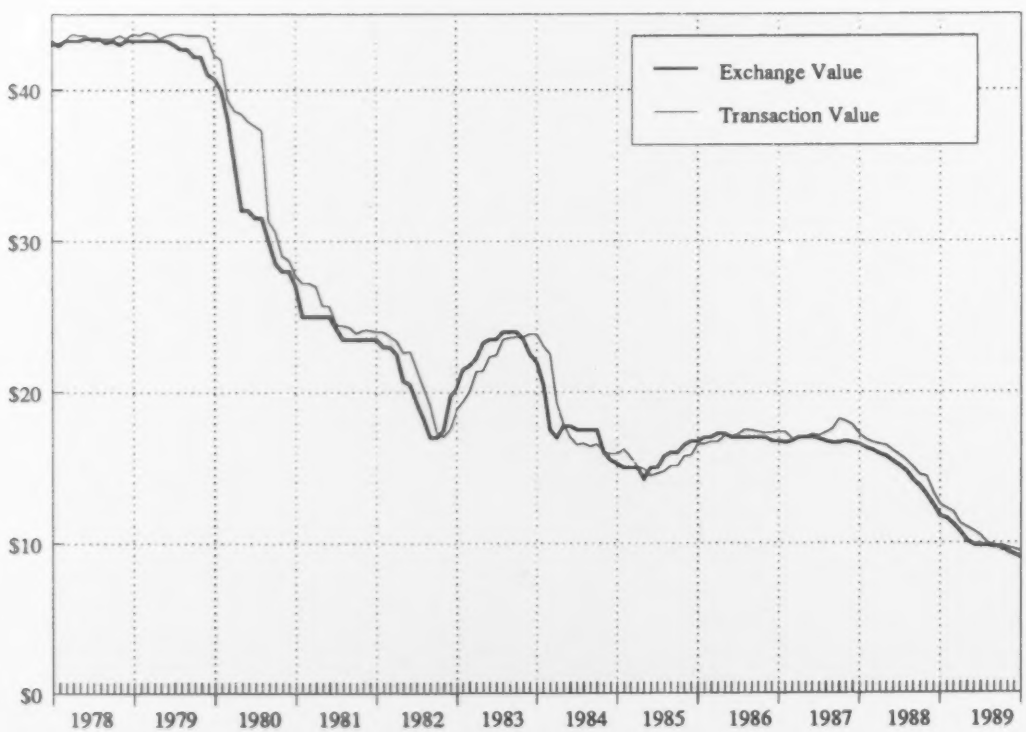
NUEXCO Historical Exchange and Transaction Values

(In US Dollars/Pound U_3O_8)





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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	**9.00**

HISTORICAL US PREMIUM (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**None**	

HISTORICAL UF_6 VALUES

Determined as of the last day of the month indicated ($US/kg U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	**26.50**

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HISTORICAL US UF_6 PREMIUM (Relative to the UF_6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**None**	

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	**9.40**

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated ($US/lb U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	**1.65**

HISTORICAL SWU VALUES (at 0.30 Percent Tails Assay)

Determined as of the last day of the month indicated ($US per SWU)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	**54**

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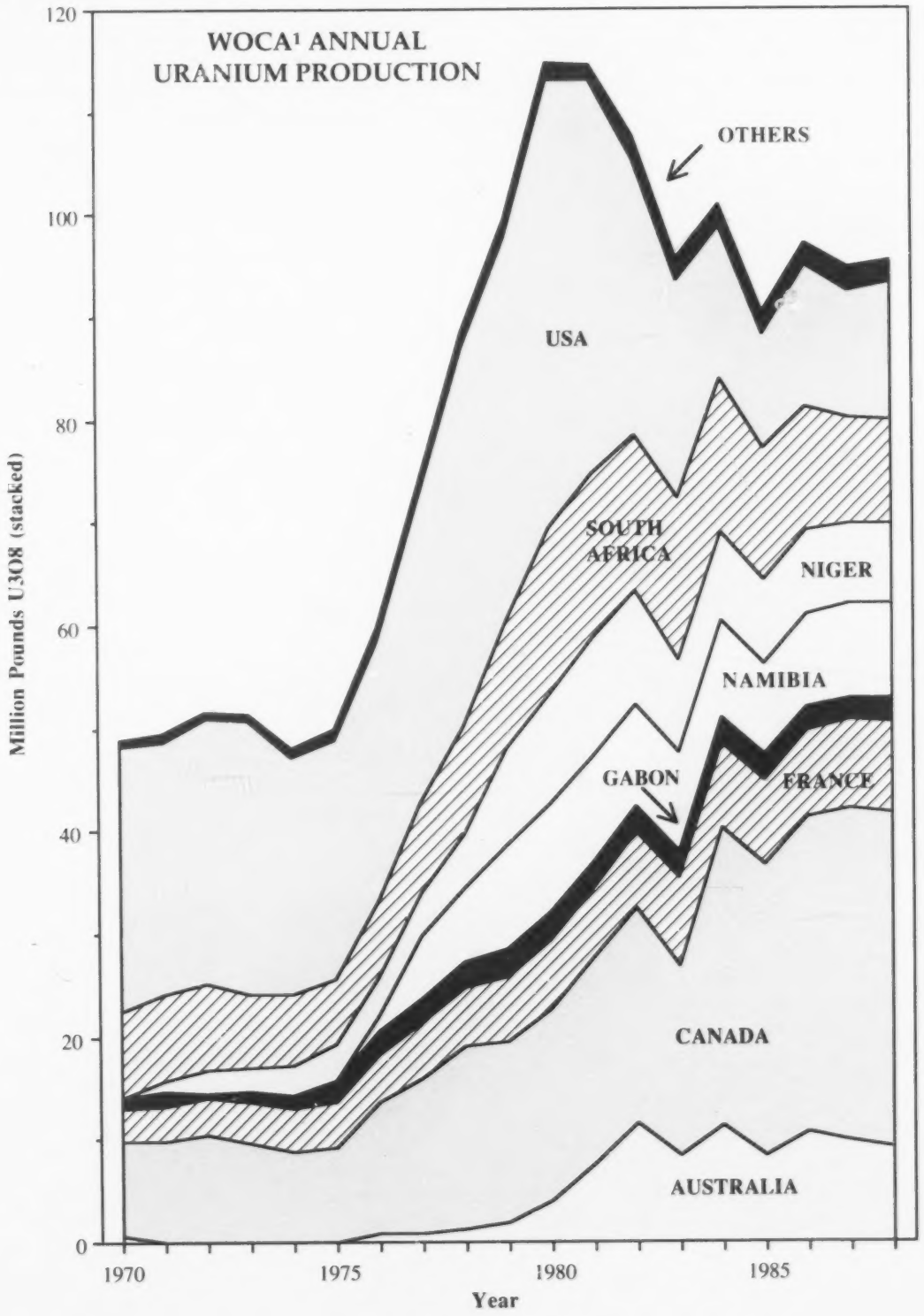
HISTORICAL MARKET DATA



1 WOCA = World Outside of Centrally-Planned Economic Areas.

2 World production in 1988 totalled 96.8 million pounds (Australia—9.3; Canada—32.3; France—8.9; Gabon—2.4; Namibia—9.2; Niger—7.8; South Africa—9.9, USA—13.5; Other—3.5).

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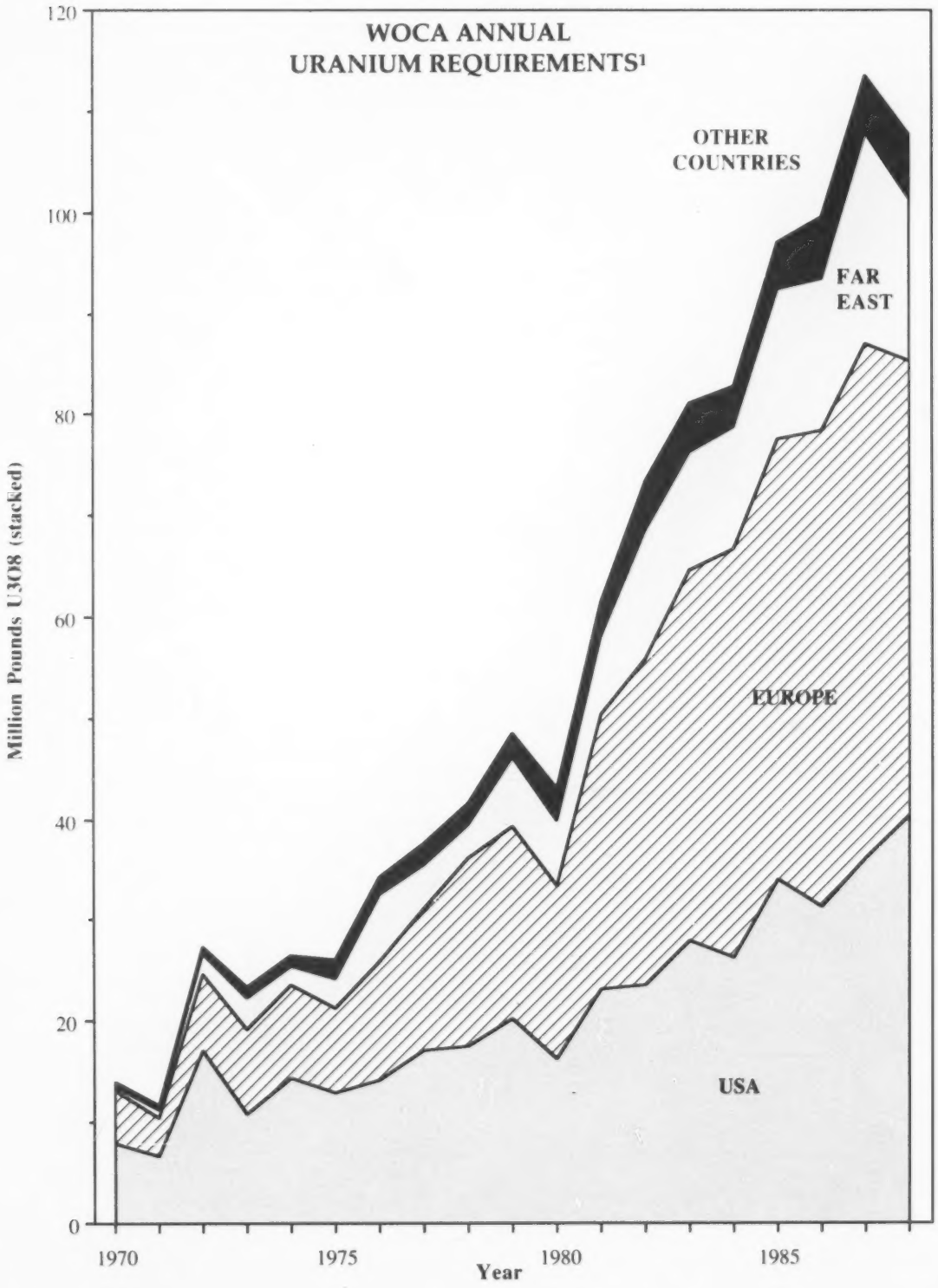

[1] Calculated by NUEXCO based on actual plant completion dates and operating performance, and NUEXCO's estimate of enriching tails assays.

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HISTORICAL MARKET DATA

US URANIUM MARKETING ACTIVITIES STATISTICS
(Compiled from data published by the US Energy Information Administration) [1]

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers[2] (million pounds U_3O_8)	Average Price of Delivered Uranium[2] ($/lb. U_3O_8)	Quantity of Uranium Imported[3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	16.10	3.6	n/a	1.2
1977	29.9	27.8	19.75	5.6	n/a	4.0
1978	37.0	31.6	21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.0	20.8	$27.37	14.8	$19.14	1.0
1988	13.1	17.6	$25.65	15.8	$19.03	3.3

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity*
1984-1988: Energy Information Administration, *Uranium Industry Annual*
[2] Data for 1976-1981 includes both domestic utilities and agents
[3] Includes imports by domestic utilities and domestic suppliers

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VOLUME AND PRICE OF URANIUM DELIVERIES TO THE EUROPEAN COMMUNITY[1]
(Compiled from data published by the Euratom Supply Agency)

Year	Volume of Deliveries to the EC[2] (in MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts[3,4]		Spot Contracts[3,4]	
			Average Price in ECU per pound U_3O_8	Average Price in US Dollars per pound U_3O_8	Average Price in ECU per pound U_3O_8	Average Price in US Dollars per pound U_3O_8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65R	$16.13R

R = Revised

[1]The twelve European Community member nations are Belgium, Denmark, France, the Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.

[2]The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.

[3]For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar.

[4]Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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AUSTRALIA

		Consumer Price Index[1] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups[2] (1984/1985 = 100)	Average Weekly Earnings — Adult Males — Australia (Australian dollars)[6]	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates[3] (June 1985=100)
1980	Avg.	95.8	83.1	—	140.8[5]
1981	Avg.	105.0	85.9	—	154.1[5]
1982	Avg.	116.7	89.0	—	174.9[5]
1983	Avg.	128.5	96.9	—	181.9[5]
1984	Avg.	133.6	98.0	—	194.4[5]
1985	Avg.	142.6	107.3	—	103.7
1986	Avg.	155.5	101.5	—	106.1
1987	Avg.	168.7	108.9	465.88	112.3
1988	Avg.	180.9	111.8	496.90	115.2
Jan	1989	—	110.6	—	122.2
Feb	1989	—	111.2	521.90	122.2
Mar	1989	188.1R	114.9	—	123.1
Apr	1989	—	117.5	—	123.2
May	1989	—	118.6	531.50P	123.7R
June	1989	192.8	119.9	—	123.8R
July	1989	—	120.1	—	124.9R
Aug	1989	—	119.2	—	124.9
Sept	1989	197.2	117.7	—	125.0
Oct	1989	—	—	—	125.0

P = Preliminary R = Revised since last month

[1]Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 =100.0). Figures shown at end of quarter represent quarterly average.
[2]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[3]Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[4]Monthly data for the period 1967 to 1986 appear in Report 233.
[5]Base: June 1976 = 100.
[6]Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).

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CANADA

		Industrial Products Price Index: All Commodities[1] (1981 = 100)	Consumer Price Index: All Items (1981 = 100)	Wage-earner Data: Average Hourly Earnings (C$)[2] Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	90.7	88.9	—	—	—	—	—
1981	Avg.	100.0	100.0	—	—	—	—	—
1982	Avg.	106.7	110.8	—	—	—	—	—
1983	Avg.	110.4	117.2	17.22	—	14.18	10.67	11.10
1984	Avg.	115.4	122.3	17.89	—	14.97	11.11	11.68
1985	Avg.	118.6	127.2	18.53	16.48	15.56	11.85	12.12
1986	Avg.	119.6	132.4	19.38	16.70	15.76	12.28	12.58
1987	Avg.	122.7	138.2	20.12	17.15	16.11	12.58	13.20
1988	Avg.	128.1	143.8	20.91	18.51	16.95	13.17	13.77
Jan	1989	130.7	146.8	21.22	19.45	18.14	13.75	13.82
Feb	1989	130.8	147.8	22.05	19.51	18.26	13.79	13.89
Mar	1989	131.3	148.5	21.90	19.65	18.35	13.62	14.10
Apr	1989	131.3	149.0	22.37	19.80	18.40	13.57	14.16
May	1989	131.4	150.5	21.89	20.02	18.17	13.76	14.27
June	1989	131.4	151.3	21.89	20.02	18.17	13.76	13.22
July	1989	131.3	152.3	21.67	19.60	17.96	13.57	12.98
Aug	1989	131.2	152.4	20.97	19.76	18.24	13.52	14.30
Sept	1989	130.9	152.6	21.97	20.61R	18.73	13.68R	14.83R
Oct	1989	130.8	153.2	22.26P	20.58P	18.69P	13.99P	14.75P
Nov	1989	130.4	153.7	—	—	—	—	—

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1986 is found in Report 233.
[2]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1986 is found in Report 233.
[3]Reports 175 through 185 list this series title incorrectly as "Metal Mining, Including Milling (SIC 050-099)."

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GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

		Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982 = 100)[2]	Consumer Price Index[3] (1985 = 100)	Production Price Index All Groups[4] (1980 = 100)	Total Employment in Mining and Quarrying[5]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand)[5]
1980	Avg.	35.53	—	51.9	100.0	709,042	2,237,689
1981	Avg.	41.89	—	59.8	113.6	722,918	2,756,928
1982	Avg.	47.25	104.2	68.6	129.4	702,041	3,181,584
1983	Avg.	51.88	115.0	77.1	143.1	700,901	3,563,282
1984	Avg.	58.95	130.3	86.0	155.1	711,511	4,134,390
1985	Avg.	68.76	151.6	100.0	181.2	724,587	4,778,612
1986	Avg.	80.22	177.9	118.6	216.6	756,637	5,767,950
1987	Avg.	95.01	223.1	137.7	246.8	751,864	6,911,395
1988	Avg.	106.69	241.1	155.4	279.3	705,355	7,774,054
Jan	1989	—	—	166.8	299.8	714,593	704,320
Feb	1989	—	—	168.2	305.4	696,329	669,983
Mar	1989	112.29	262.8	170.9	310.0	702,746	695,843
Apr	1989	—	—	173.1	315.0	658,677	634,344
May	1989	—	—	175.9	319.6	706,056	721,263
June	1989	113.76	267.0	177.7	320.9	706,810	720,586
July	1989	—	—	179.3	324.0	711,648	775,002
Aug	1989	—	—	181.8	327.5R	703,812	793,475
Sept	1989	119.76	280.2	183.4	329.3	—	—
Oct	1989	—	—	185.1	333.1	—	—
Nov	1989	—	—	187.0	—	—	—

P = Preliminary R = Revised since last month

[1]Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 236.
[2]Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.
[3]Central Statistical Service, Pretoria: All income groups-weighted average, Historical Data by month appears in Report 236.
[4]Central Statistical Service, Pretoria: All commodities for consumption in South Africa.
[5]Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.

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UNITED STATES

		Producer Price Index[1]		Consumer Price	GNP Implicit Price	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	Index[2] (1982-1984 = 100)	Deflator[3] (1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.30	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.67
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.56	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.7	13.09	13.22	12.67	10.13
Jan	1989	109.4	110.5	121.1	—	13.80	13.49	12.85	10.27
Feb	1989	110.1	110.8	121.6	—	13.66	13.48	12.88	10.26
Mar	1989	110.5	111.5	122.3	125.4	13.71	13.51	12.91	10.30
Apr	1989	111.8	112.3	123.1	—	13.68	13.65	12.92	10.31
May	1989	112.1	113.2	123.8	—	13.60	13.57	12.98	10.33
June	1989	112.4	112.9	124.1	126.0	13.62	13.66	12.98	10.37
July	1989	112.2	112.8R	124.4	—	13.70	13.75	13.12	10.41
Aug	1989	111.4	112.0	124.6	—	13.64	13.72	13.08	10.40
Sept	1989	111.9	112.3	125.0	126.8	13.70R	13.99R	13.18	10.47R
Oct	1989	112.4	112.7	125.6	—	13.80P	13.89P	13.24R	10.44R
Nov	1989	112.2	112.7	125.9	—	—	—	13.29P	10.50P

P = Preliminary **R** = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 233.

[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 233.

[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 233.

[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 233.

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CALENDAR

Nuclear Industry Calendar

1990	
Jan. 22-26	***Nuclear Fuel Cycle Committee*** (Las Vegas, Nevada), sponsored by the American Society for Testing and Materials. Contact Ms. Katharine Schaaf at the ASTM at 1-215-299-5529.
Mar. 4-8	***7th Pacific Basin Conference*** (Sheraton Harbor Island Hotel, San Diego, California), sponsored by the ANS. Contact the ANS Meeetings Department at 1-312-352-6611.
Mar. 12-15	***Radioactive Material Transportation Basic Workshop*** (Oak Ridge, Tennessee). Contact Teresa Yearwood at 1-615-482-9031.
Mar. 25-28	***Fuel Cycle '90 Conference*** (Opryland Hotel, Nashville, Tennessee), sponsored by the US Council for Energy Awareness. Contact the USCEA Conference Office at 1-202-293-0770.
Apr. 8–12	***First Annual International High-Level Radioactive Waste Management Conference*** (Caesar's Palace Hotel, Las Vegas, Nevada), sponsored by the American Nuclear Society and American Society of Civil Engineers. Contact the ANS at Meeetings Department at 1-312 352-6611.
Apr. 9-11	***23rd JAIF Annual Conference*** (Kyoto, Japan). Contact Ms. Sachie Sugoh, Dept. of Planning and International Affairs, JAIF, at 03-508-9056.
Apr. 22-25	***INFO '90*** (Westin Hotel, Dallas, Texas), sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.
Sept. 5-7	***Uranium Institute 15th Annual Symposium*** (London, United Kingdom). Contact the UI at 44-1-225-0308.
Sept. 16-19	***Uranium Seminar '90*** (Hyatt Regency, San Antonio, Texas), sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.
Nov. 11-14	***Nuclear Energy Forum*** (Washington Hilton, Washington, D.C.), sponsored by the USCEA and ANS. Contact the USCEA Conference Office at 1-202-293-0770, or the ANS Meetings Department at 1-312-352-6611.

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